NEW HAMPSHIRE SUNDAY NEWS
June 16, 1996

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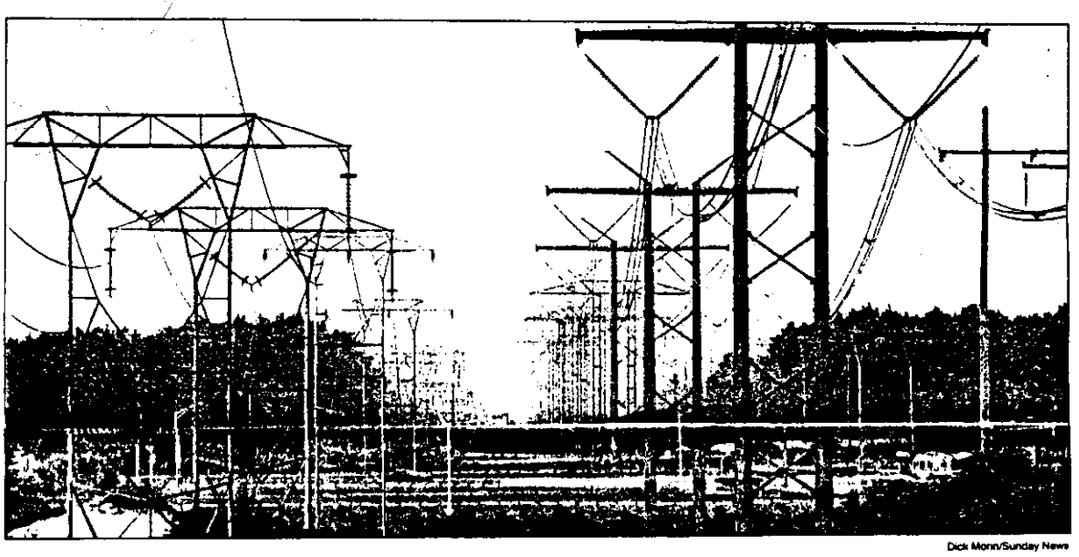
Freedom Energy
ENRON
Green Mountain ENERGY PARTNERS L.L.C.
Central Vermont Public Service
Granite State Energy A NEES company
WORKING ASSETS
Unitil
PSNH Energy
NORTHFIELD MOUNTAIN ENERGY
NUW
WEPCO WHEELED ELECTRIC POWER COMPANY
Central Maine Power
ChoicEnergy

# POWER to CHOOSE



Dick Monn/Sunday News

## What You Need To Know About Choosing An Electric Utility

By TOM FAHEY
Union Leader Staff

AFTER YEARS of watching their electric bills soar, New Hampshire ratepayers are taking the first steps toward being able to shop for cheaper power.

The state's retail electric power project began May 28, capping a two-year effort to bring competition to New Hampshire ratepayers. It also marks the beginning of an end to government-approved monopolies among power companies.

No longer can electric companies be assured that customers in a geographic region are theirs alone. The companies will continue to own power lines, poles and meters. But customers are on their way to choosing their source of power supply as easily as they choose long distance telephone companies.

Those fed up with with rates they think are too high, or a power company they think treats them poorly, can jump to another supplier, cutting into the roughly 20 percent of their monthly bill that covers power costs.

Compared to the plodding pace of most utility regulation, the era of electric competition is moving ahead at light speed, both in New Hampshire and at the federal level.

Four New England states including New Hampshire are moving to total deregulation by 1998. New York's legislature ordered public utility regulators to plan for competition before the year 2000.

New Hampshire's pilot project involves 17,000 customers, including several town and city governments. When the power industry is completely deregulated, it will affect each of the state's electric customers, including more than 400,000 at Public Service of New Hampshire.

Throughout the country, electric companies, regulators and consumer advocates are watching New Hampshire's pilot project. They want to see what pitfalls competition holds, the kinds of prices that prevail, and what kinds of marketing packages work best when people can choose their power supplier freely.

The Federal Energy Regulatory Commission has ordered utilities to open their transmission lines to outside energy providers. Estimates are that the deregulated electric market will save Americans up to $5.4 billion a year.

There are plenty of hurdles to get past yet. The term 'stranded costs' will become more frequently heard as deregulation moves ahead. It describes investments utilities have made in generating plants, transmissions systems and the like over their years as monopoly sources of power.

In a deregulated market, the companies will want to recover those costs through the rates they charge for carrying and distributing electricity generated by their customers. Power bills will remain high for PSNH customers, for example, if it is allowed to continue collecting most or all of its Seabrook nuclear power plant costs. Regulators want to limit the recovery of those investments, forcing stockholders of power companies to absorb the rest.

The pilot project has dispensed with that issue by setting a straight 50-50 split between ratepayers and the utility. But it's one of many nettlesome issues that will have to be settled, by mutual agreement, utility regulators or the court system, before the electric industry can be truly deregulated.

## Inside This Section

# Utility Roulette: A New Era Dawns

## POWER to CHOOSE

By TOM FAHEY
Union Leader Staff

New Hampshire's pilot project on electric competition will turn upside-down the time-honored power system for customers, power companies and regulators.

Customers will choose their power company, power companies will fight to keep their customers on the other end of the line and regulators will keep busy deregulating the industry in a way that's fair for everyone.

What will the state get in return for all this trouble? That depends on who you ask.

One expert who's been working for 18 years on deregulation described this two-year project as "a landmark kind of activity."

Some look for practical lessons on the pitfalls facing any state that tries to open its electric power system to competition.

Others see it as a live experiment that will help them design marketing packages in a deregulated environment.

State consumer advocate Michael Holmes says it spells the end of the days when power companies can build generating plants without any risk, passing costs on to ratepayers.

The Public Utilities Commission is hoping it will provide a peek into the future as it designs guidelines to deregulate the industry for the 97 percent of New Hampshire standing on the sidelines during the pilot project.

PUC executive director Sarah Voll said the aim is simple — "We're looking to give 17,000 customers and their friends and neighbors some hands-on experience in how the competitive market might work. We're giving them, the utilities, and, frankly, us an idea of what our roles will be in that kind of world."

Academic types don't like the project much because it doesn't follow scientific rules that will yield statistics on which to base published reports in academic journals.

That doesn't bother some experts.

"If you want publishable results, meaningful information, then we probably do not have the pilot for you," said Jacqueline Kilgore, president of the Public Utility Policy Institute, a non-profit research group based in Concord. "But if you want a pilot that faces in a practical way the problems we will face in restructuring (the electric industry), we have that."

New Hampshire's 17,000 or so pilot project participants were in large part self-selected, not the way to begin a scientific sampling. No control groups were set up, and other typical scientifically correct steps were ignored.

"You have to remember none of this is set up to draw important information for the industry and regulators," said Richard LaCapra, principal of LaCapra Associates in Boston. He acts as a consultant to regulators nationwide as they grapple with restructuring the power industry.

"What's coming out of this is very real: the kinds of markets, the kinds of people pursuing customers, the range of customer choice, the range of tensions (between industry and regulators.) I don't think we can dispense with those observations simply because they don't fit into a scientific sample."

He said the pilot will bring out the most important down-to-earth issues. Among them will be how much people are willing to pay for energy generated by renewable resources, hydro or wood-fired power; what companies are interested in becoming suppliers; how much they will spend on marketing and how customers will respond to a variety of power and pricing options that fit their needs.

This kind of project has been in the making for awhile. LaCapra has been working on deregulation issues since 1978.

"From my perspective, I'm glad somebody did it. I'm glad New Hampshire stepped forward and said we are going to put some of this in place," he said.

Douglas Hyde, president and chief executive officer of Green Mountain Power in Burlington, Vt., also takes the more practical approach to the project.

"The outcome we all want to see is one in which competition for retail energy sales occurs. I don't think we have any choice of doing that unless we practice. We regard the pilot project in New Hampshire as just that — practice," he said.

To date, little power has moved across power lines from companies competing with entrenched utilities. Hyde shakes off that problem as complications in the early stage of a complex process.

"There will be some rocky places, but there are a lot issues to be resolved. But that is what a pilot is for, to learn by doing," he said.

"We think the intense interest being shown in it by energy sellers from all over the country is an indication of just how vibrant a competitive energy market will be on a national scale."

Hyde's company has formed Green Mountain Energy Partners with Hydro Quebec, Consolidated Natural Gas and Noverco for the pilot project.

One surprise, Hyde said, has been the pricing structures that have evolved.

"Prices have been driven down to extraordinarily low levels by sellers more interested in getting a share of the market than in making money," he said. Those prices won't hold in a completely open market because profits will become more important.

"I think people are going to have to be more realistic about how much they will save outside the environment of the pilot project," Hyde said.

"In the broader market, the marketing knives are going to get real sharp," as companies try to lock in customers by pushing themes, such as environmental responsibility and renewable energy sources, or combinations of services.

Prices, technology, energy management audits and devices and other service combinations that "we are not good at imagining yet," will be part of the mix, he said.

"It wasn't long ago we thought telephones were black, were screwed into the wall and couldn't move. Now we see them as being combined with computers and TV. . . . I expect to see some historically unprecedented alliances as companies try to combine technologies to make more appealing offerings to customers."

Consumer advocate Holmes said he is being careful not to expect too much.

"I just hate to see people draw too many conclusions," he said. "At this point we haven't wheeled a kilowatt hour of electricity."

He echoed Hyde's surprise over how low prices from companies have been. Predictions were that the average price would be about 3.5 cents per kilowatt hour. Instead, that's the high end, with the average price below 3 cents a KWH.

It's important to remember the prices for power only represent about 20 percent of the average electric bill. The other 80 percent comprises charges for tranmission, distribution, accounting and other expenses, including "stranded costs" representing the costs of paying for generating plants and other investments.

Unitil and PSNH have refused to participate in the program until objections about rates and the funding of customer discounts have been settled. Holmes said those problems are the kind of things the pilot is meant to expose.

"It's just as well these utilities' fears and problems come out now rather than when we address it in the main phase of deregulation. I think the pilot program is serving already much of the purpose it was intended to serve. It's a learning experience."

Holmes most wants to see whether new companies are willing to invest in generating plants that provide low-cost power for general sale.

"In the long term, this isn't going to work unless people invest money in generation," he said. "If we get somebody building for competition and it goes sour, they eat the cost instead of us. In my mind, that's what this is all about. That's the most satisfying part, the part that excites me most. When I think about this working, I realize that New Hampshire will not have another economic disaster like Seabrook. This has been painful and its hurt people. I see this as the cure. . . . Seabrook has been a 20-year

POWER, Page 8N

## The Power Grid:

(Prices do not reflect cash premiums or other incentives, or include the costs of transmission or distribution.)

| Utility companies | The Offer (Cents per kilowatt hour, plus any other incentives.) | Estimated Monthly Bill: For 600 kwh month | For 1,000 kwh month | For 1,500 kwh month |
|---|---|---|---|---|
| Central Maine Power | 0-600: 3.8 cents pr KWH. 600-1000: 2.8 1,001-plus: 1.8 | $22.60 | **$34.00** | $43.00 |
| Central Vermont Public Service | 2.75 cents per KWH. 500 KWH free with 24-month signup. | $16.50 | **$27.50** | $41.25 |
| ChoiceEnergy | 3.25 cents per KWH plus a bonus equal to half one month's bill of your choice from last year. | $19.50 | **$32.50** | $46.75 |
| ENRON | 3.491 cents per KWH, plus $50 cash bonus for signing up. | $16.67 | **$32.83** | $52.37 |
| Freedom Energy | 2.69 cents per KWH. | $16.14 | $26.90 | $40.35 |
| Granite State Energy, A NEES company | 2.5 cents per KWH, plus a bird feeder and a 60-day low-price guarantee. | $15.00 | $26.00 | $37.50 |
| Green Mountain Energy Partners LLC | 2.6 cents per KWH plus $20 in "Eco-credits" on signup. | $15.60 | $26.00 | $39.00 |
| Northfield Mountain Energy | 3.11 cents per KWH, plus an energy-saving package worth $59. | $16.66 | $31.00 | $46.65 |
| NUM | Monthly $9.95 fee, plus 1 cent per KWH for first 600 KWH, then 2.9 cents after, plus a "lowest pr base" offer. | $15.95 | $27.55 | $42.05 |
| PSNH Energy | 3.3 cents per KWH, plus $25 bonus. | $19.60 | $33.00 | $49.50 |
| Unitil | 2.4 cents per KWH. | **$14.40** | $24.00 | $36.00 |
| WEPCO, Wheeled Electric Power Company | 2.29 cents per KWH for first 600 customers; 2.39 cents thereafter. | **$13.74 o $14.34** | **$22.900 $23.90** | **$34.36 o $35.65** |
| Working Assets | 3.5 cents per KWH, plus 1 percent donation to environmental group of choice. | **$21.00** | **$35.00** | $52.50 |

***It's important to remember that the prices for power only represent about 20 percent of the average electric bill. The other 80 percent comprises charges for tranmission, distribution, accounting and other expenses, including "stranded costs" representing the costs of paying for generating plants and other investments.***

**POWER to CHOOSE**

## CHRONOLOGY

*The events leading to the pilot project launch May 28:*

**Feb. 1, 1972**

Public Service Co. of New Hampshire announces plans to build a pair of 1,100 megawatt nuclear power plants at Seabrook, N.H., for $850 million. The eventual cost will be $6.5 billion for one power plant.

**May 8, 1979**

Gov. Hugh J. Gallen signs into law a bill that bars PSNH from Construction Works in Progress charges on ratepayers as a means of financing Seabrook construction.

**Jan. 28, 1988**

Swamped by Seabrook debt, PSNH files a Chapter 11 bankruptcy at U.S. Bankruptcy Court in Manchester.

**Dec. 14, 1989**

The New Hampshire Legislature approves a bill later signed by Gov. Judd Gregg that authorizes Northeast Utilities to boost electric rates by 5.5 percent annually for seven years. The rate deal is part of a package in which NU acquires PSNH, ending its Chapter 11 bankruptcy.

**March 24, 1993**

Gov. Stephen Merrill vows to fight NU/PSNH's attempt to raise rates by 6.7 percent — its fourth 5.5 percent hike plus fuel charges and accounting costs. NU relents and a lower hike goes through. Still, New Hampshire's rates are among the nation's highest.

**Sept. 23, 1994**

Freedom Electric files with the Public Utilities Commission asking to be certified as a utility and compete directly with NU/PSNH for customers.

**June 1, 1995**

The PUC rules that NU/PSNH has no right to an electric power monopoly in the state. NU/PSNH puts a 5.5 percent rate hike into effect, rejecting proposals for a pilot project on competition. Gov. Merrill accuses NU/PSNH of "contempt for residential ratepayers," and threatens to buy power from Canada. Days later, the state Legislature orders a committee to study how to implement pilot program.

**Feb. 21, 1996**

PSNH and the PUC reach agreement on how to structure a pilot project. May 28, 1996, is the proposed start-up date, later set in stone by legislation.

**May 1, 1996**

Nearly 17,000 homeowners and businesses are selected to receive power from alternate suppliers in a two-year pilot program.

**May 13, 1996**

New Hampshire Supreme Court upholds the PUC ruling against NU/PSNH's monopoly argument.

**May 24, 1996**

The Federal Energy Regulatory Committee allows the state's pilot to start on time, waiving some filing requirements.

**May 28, 1996**

The pilot project begins, but because of company delays, only customers of Connecticut Valley Electric Co. benefit. Granite State Electric customers soon follow. Potential PSNH and Unitil pilot customers continue under monopoly service.

*Compiled by Tom Fahey*

# Utility Choice Not Any Easier on Bigger Scale

■ For businesses, sometimes reliability is more of a factor.

POWER to CHOOSE

Walter George planted the seven small blue spruce trees he got in the mail from a company that wants to sell him electricity.

There were seven trees because the seven meters at George's Ferndale Acres Campground on Hill Road in Lee were among those picked at random to participate in a two-year experimental electric utility competition.

The seedlings from Green Mountain Energy of Burlington, Vt., were a highlight in the avalanche of letters and brochures from competing power companies, but George said he's pretty much decided to stick with his current supplier, the New Hampshire Electric Cooperative, which distributes power but has no generating plant.

"I mailed the co-op's letter back to them telling them to use their best judgment to look for the lowest rate for us," George said.

Competition is obviously a new game for the electric companies using mailings, telemarketing, personal contact and gimmicks in attempts to win over the 17,000 business and residential customers picked for the experiment.

The response to the power providers — there are about 30 competing — runs the gamut from the thoughtful individual's review of proposals, to collective studies by towns, to the solicitation of bids.

"We're going to put together a request for proposals and send it out to every company on the list," said James W. Dombrosk, the campus energy manager at the University of New Hampshire.

UNH's research farm, which spends about $10,000 a year on electricity, is in the pilot program because it is in Lee, which entered a grouping of electric accounts in the special lottery pool called GAC, Geographic Area of Choice.

In addition to rates, Dombrosk said his evaluation will factor in where the power will be generated, how it will be transmitted and what the backup will be.

Some customers selected in the drawing have found their business unwanted.

Bob Foster said his Andover Lumber Company was taken off the list because, as a sawmill capable of generating its own power, it already qualifies for discounted rates.

Philip M. Vaughan said Central Maine Power had the best rates of the nine companies he analyzed, but all the power salesmen lost interest when informed the meter eligible for discounts was at the Vaughan Wood Products clock making plant on McGuire Street in Concord — not the New Hampshire Clocks' small retail store on Main Street.

"When I told them we use 17,000 kilowatts a month, they backed away the way an elephant does from a porcupine," Vaughan said.

For some, reliability is key, but others said they are weighing environmental considerations as well as rates.

At Marshall's Flowers & Gifts in Penacook, Lorrie J. Carey said, "I've been getting calls practically daily from various power companies and with each phone call comes a lower rate."

Carey said she will sift through the proposals, comparing rates and the various service fees. It's a lot of effort for what may be minimum savings, but, "I've always been interested in options. We can't do any worse than with the power rates as they stand now," Carey said.

Reliability is an issue for her because, with fragile flowers, "power inconsistency could cause a spoilage problem."

Of the spruce tree sent by Green Mountain Energy, Carey said, "Environment is important, but you have to determine if this is a marketing gimmick or truly a concern of the company."

Green Mountain won the endorsement of Brookline selectmen last week. Customers in the Brookline GAC are not bound by the selectmen's choice, but the company did combine competitive low rates with an offer to establish a fund to benefit the community.

Granite State Electric and Green Mountain Energy are among the competitors who have focused on environmentally friendly "clean electricity" and 90 percent of Green Mountain's power is hydro-generated.

"If they had been totally coal-powered or totally nuclear-powered, the decision wouldn't have been anywhere as easy to make," said Peter A. Cook, who reviewed the various proposals for the Church of Christ of Brookline.

Cook, a business and marketing consultant, has been unimpressed by the performance of the utilities that are used to operating in a regulatory environment.

"This was clearly a new adventure for them in the competitive market place. The phone calls I received at my house were abysmal. They were just throwing stuff at the wall to see if it would stick. For example, Green Mountain was the only one of 27 or so vendors who offered a sliding scale based on how many Brookline customers sign up."

Cook, who will recommend his church buy power from the company endorsed by the selectmen, said he is not worried about reliability since all the companies in the program meet standards set by the Public Utilities Commission.

But Rebecca Smith, executive director of Rivermead in Peterborough, said reliable electricity is critical to a retirement community where the average age is 79.

And Joel Weissman said reliability is key to Mailcall, his rapidly growing mail service business in Peterborough.

"We depend on the computers and the phones. If the system goes down, we're dead in the water," Weissman said.

A Texas-based power company has aggressively sought Weissman's business and he will consider the selectmen's choice, but he was leaning last week toward his current supplier, Public Service Company of New Hampshire. PSNH's rates may come in higher, but the company has kept the lights on.

"Let's say we were to save $100 a month. What is the worth of insurance?" asked Weissman.

Peterborough selectmen have reviewed proposals from 13 companies seeking the business of 1,400 customers in the town's GAC.

"This has been a colossal mess to untangle," said Selectman Charles Leedham. "There were so many things we needed to learn in a hurry. We were telling these guys, 'We've been in this for four weeks and you've been in it for 40 years and we're trying to catch up to you.'"

What began as a strictly rate-reducing experiment has become something more, Leedham said.

"The way this is developing, not only can people choose who they want to provide their electricity, they can also look at how these companies are getting the power. If you're anti-nuke, you can reject a company on that basis; if you prefer hydro or windmills or natural gas, you can select on that basis."

Selectman Larry Ross, who also directs the region's economic development effort, said rates, the company's track record and its willingness to work with the community in meeting future energy requirements were all considered. Just as important, he said, was "the environmental culture of the company and the nature of the power generation in terms of its environmental impact."

> ***"When I told them we use 17,000 kilowatts a month, they backed away the way an elephant does from a porcupine."***
>
> —Philip M. Vaughan of Vaughan Wood Products in Concord.

Robert LaPree/Union Leader

Turbines at the Amoskeag Falls Hydro Station.

## Heat Pump: New Twist On Not-So-New Idea

Homeowners seeking new ways to conserve energy and stretch their energy dollars are turning down their thermostats and adding insulation to their homes.

To help homeowners achieve energy savings, architects, builders and manufacturers have been developing energy-efficient heating and cooling equipment that offers long-term energy savings. One device that has been attracting attention as an efficient, economical alternative to conventional heating and cooling systems is the air-to-air heat pump.

Heat pumps are not new; electric heat pumps were first developed and marketed in the 1930s. Recent development in heat pumps marketed today have made them more reliable and many applications can offer substantial energy and dollar savings.

A heat pump is a device which extracts available heat from one area and transfers it to another. Even cold air contains some heat, and heat pumps can extract heat from the outside air on a cold day and transfer it indoors to maintain a comfortable temperature. A heat pump can also work in reverse direction in the summer.

The heat pump doesn't really give you something for nothing, however. Instead of using electricity to heat the air, it uses electricity to move existing heat from the outside into the house.

Heat flows naturally from a warm area to a cooler area. (A heat pump, like an air conditioner, works against this natural flow.) In its heating mode, a heat pump's fan blows cold air from outside across a coil (called the evaporator) containing refrigerant, a liquid which boils at a very low temperature. When the refrigerant boils, it becomes a vapor. This vapor is sucked into a compressor where it becomes a high-pressure, high-temperature vapor. It is then forced through a coil within part of the heat pump located indoors. As cool air passes over the coil, the vapor cools and turns back to a liquid

# Bright Ideas For Saving On Light Bill: New Bulbs

POWER to CHOOSE

The simplest home lighting re-fit, a screw-in replacement for ordinary incandescent bulb, n be a big energy-saver.

Many types of replacement lbs are available. These in-ude other incandescents — ypton-filled, tungsten-halogen, frared-reflective coated, or ypton-filled long-life. Also ailable are the compact fluores-nts: integral units, modular n and quad tubes, and cir-nes.

Which to choose? The decision not a simple one, but don't be scouraged. This article will help u weigh the many factors that ay a part in the choice, such as ht quality, how much light is eded, and lifetime of the lamp.

Many ordinary incandescent xtures are too cramped for com-act fluorescents. If a fluorescent too large to fit a lampshade mp (the metal bracket that lds the shade above the bulb), mp extenders can be purchased at will solve the problem. Be-re purchasing a harp extender wever, bear in mind that it ises the lampshade, which may rtually expose the lamp — thus feating the purpose of the ade.

Compact fluorescents are hea-er than the incandescent bulbs ey replace as well, so they are nsuitable for some standing mps (they make them too top-avy) or some hanging fixtures.

terms of bulk, compact fluo-scents have shrunken consider-ly from the original circular screw-in fluorescents (also called circlines), like the GE Circlite or Philips Luma-Circle. The older type are still available but have been surpassed by newer single-unit and modular lamps in nearly every way.

Besides their welcome reduction in size, the newer lamps are less prone to hum and flicker, maintain their light output more consistently over lamp life, and have better efficacy and color rendering. The new circlines last longer, 12,000 hours compared to about 9,500 hours. They also come in a higher wattage range than compact fluorescents, so they may be the only screw-in fluorescent alternative to the higher wattage household incandescent bulbs.

When a fixture won't accommodate a compact fluorescent, you still have the choice of the improved incandescents to replace normal A-line bulbs. They are the same size and, except for tungsten-halogen, the same weight as standard bulbs.

Encapsulated tungsten-halogen bulbs, like Sylvania "Capsylites," are heavier than ordinary incandescents, which may make them unsuitable for some fixtures.

When contemplating replacing a bulb, think about whether the fixture was designed for a particular size and shape of bulb. Since energy-efficient bulbs are often not the same shape or size as the bulbs they replace, they may actually give less light from a particular fixture even though the bare bulbs give off the same number of lumens.

One lighting designer discovered that an energy-minded homeowner had changed all the bulbs in recessed ceiling fixtures with tungsten-halogen bulbs. The new bulbs were more efficient than the previous ones but also wereconsiderably shorter. Since the reflectors in the fixtures were designed to project light from a certain point in the bulb, using a shorter bulb drastically cut the light leaving the fixtures. In this case, the improvement in efficacy of the bulb was swallowed up in the greater loss of efficacy of the bulb and fixture together.

The purchase price of standard incandescent bulbs (as opposed to operating cost) is low compared to energy-efficient lamps. However, the hidden costs of choosing "normal" light bulbs — long-term electricity costs and costs of repeated replacements of these relatively short-lived lights — make standard incandescents, in fact, more expensive. Even if you buy an energy-efficient light that sells for many times the price of the incandescent bulb (which they often do), you will save money if the new light cuts electricity use enough and lasts long enough.

But what's enough? You can compare two bulbs that put out about the same amount of light but use different amounts of energy (different wattages) and last different amounts of time by calculating the cost per 1,000 hours for each. This cost takes into account the purchase price of the lamp, the cost to operate it and how long it lasts. If the light you are considering as a replacement gives a lower cost per 1,000 hours, then it's "enough" to save you money, no matter how much greater its purchase price may be.

Knowing the electricity price per kilowatt-hour (kWh), the wattage of the bulb, its purchase price, and its lifetime, follow these steps to calculate the cost per 1,000 hours: First, multiply the cost of electricity by the wattage of the lamp and save the result. Then, divide the lifetime by 1,000 hours.

Next, you divide the purchase price by the value you just calculated. Finally, add the result of the last operation and the one you saved earlier to give the cost per 1,000 hours.

The cost per 1,000 hours can aid in calculating how long it will take for the energy savings to pay back the additional cost of the efficient lamp. Divide the difference in purchase price by the savings per 1,000 hours to get the amount of hours until the compact fluorescent lamp will have paid for itself. This is called the "simple payback time."

# Some 17,000 To Join in Utility Experiment

**POWER**

(Continued From Page 1H)

nightmare."

Killgore said PUPI is watching closely to see what the pilot uncovers in the area of market power — how entrenched utilities use their strength to fight off competitors.

"If you notice, all the New Hampshire utilities are actively and aggressively marketing power in this program. At the same time, there are 29 companies registered to sell power, but less than half are actually marketing power. Why is that? It has been suggested that one of the reasons is that some companies are selling at or below their cost of power," she said.

Northeast Utilities, with a strong presence throughout New England, "has sufficient assets to make it impossible for competitors to enter the market in any meaningful way."

Killgore said it's important to stop big utilities from using monopoly power to prevent true competition. She said the pilot provides a window to a deregulated future.

"We're getting firsthand knowledge of how to effectively address the market power issues. It's important because if we deregulate and don't address that problem, we will have a deregulated market that doesn't work and isn't competitive."

***"If you want publishable results, meaningful information, then we probably do not have the pilot for you. But if you want a pilot that faces in a practical way the problems we will face in restructuring (the electric industry), we have that."***

Jacqueline Killgore, president ofthe Public Utility Policy Institute

# Ordinary Light Bulbs Better at Heating Than Lighting

An incandescent lamp consists of a tungsten wire, or "filament," encased in a glass housing. The filament heats up when electricity passes through it, just like the wires of a resistance heater.

In fact, ordinary bulb filaments are much more effective at producing heat than light. Most of the power to the bulb is wasted in radiated heat. (In fact, in commercial installations of many energy-efficient lamps, a secondary payoff is found in a major reduction in air-conditioning.)

Fluorescent lights work on a different principle. The compact fluorescents that we focus on in this article contain three main parts: the lamp, the ballast, and the adapter (often the ballast and adapter or all three parts, are sold as an integrated unit.) The inside surface of the glass envelope is coated with phosphors - substances that glow when bombarded with ultraviolet light. The lamp is filled with mercury gas that is ionized by electricity passing through it. The ionization generates the ultraviolet light that excites the phosphors. Flourescent lights produce much less waste heat for the amount of visible light they produce than do incandescents.

The ballast converts ordinary household 120 volts current to the high voltage needed to ionize the gas in the lamp. Then, once the lamp is aglow, the ballast limits the amount of current that flows through the lamp, since less is needed to maintain the light once it has started up. Most ballasts, called "core-coil" ballasts, consist of loops of wire tightly wound around an iron core. Some fluorescent lights now are made with solid-state (electronic) ballasts.

The adapter permits the compact fluorescent to be screwed into a "normal" (also called "Edison") light socket, the kind with which we are most familiar.

The most familiar rating of a light is its power consumption, measured in watts (W).

Visible light output is measured in lumens (lm) and the ratio of the number of lumens given off to the number of watts consumed. The efficacy is a handy number for comparing the relative energy-efficiency of two lights that are of different light-producing strengths. Efficacy is analogous to "unit-pricing" which allows simple cost comparisons of different products even though their package sizes aren't identical.

Higher efficacy means a more efficient light and vice versa. The efficacy for standard incandescents depends on bulb size, varying from 12 to 19 lm/W over the 40 to 150 watt size range. Long-life standard incancescents are less efficient.

# The Price of Keeping Cool

## Some Research Can Help Control Air Conditioning Cost

Air conditioning does more than cool the air. It truly "conditions" it by removing dust and dirt as the air is drawn through a filter.

Air conditioning also lowers the humidity, making the air more comfortable at any temperature.

These benefits, however, can be costly. Depending on your region of the country, air conditioning can account for anywhere from 5 percent to 50 percent of your household energy budget. Because an air conditioner is such a sizeable investment, you can save money and energy by carefully purchasing and operating your air conditioner.

When shopping for an air conditioner, first consider what type of system best suits your needs — central air conditioning or room air conditioning. Central air conditioners are designed to cool the whole house, while room air conditioners are usually window or wall mounted and therefore only cool the immediate area.

Central air conditioners generally provide the greatest comfort, but they cost more than room units. If several rooms need to be cooled, however, a central system is probably the best buy. Central systems generally are not cost effective as an addition to an existing home unless the existing ductwork can be used.

Room air conditioners are mounted in windows or built into an external wall.Room units are less expensive than central; however, they only cool the general *space in which they are located.* There are three types of room units: window models can be installed in most windows; casement window models, used in narrow, vertical windows, usually require the removal of a window panel for installation; built-in models are encased in a sleeve installed in the wall.

In sizing an air conditioner for your home,consider the dimensions of the area to be cooled and how the area is used. Based on size alone, an air conditioner generally needs 20 British thermal units (Btu) for each square foot of living space. For instance, to air condition a room that is 15 feet wide and 20 feet long, you would calculate: 15 x 20 x 20Btu = 6,000. Thus, an air conditioner with a 6,000 Btu capacity would be required. This is a very simplified calculation method, since it does not take into account such important factors as the room's height, local climate, or how well insulated and airtight the house is.

POWER to CHOOSE

Calculating Btu requirements becomes more complicated when you consider an area's use. For instance, if you use passive cooling techniques such as shading, ventilation, or vegetation, your Btu estimate can be lowered. Likewise, your Btu needs are increased by factors such as the size of the household, frequent use of heat-producing appliances, or high summer humidity levels. An appliance dealer will use these factors to adjust your estimated Btu requirement. For most efficient cooling, purchase a unit with a capacity within 5 percent of this estimate.

If you'd prefer to calculate your own capacity needs, you may send away for a "Cooling Load Estimate Form" from: The Association of Home Appliance Manufacturers, 20 North Wacker Drive, *Chicago, IL 60606.*

When choosing between units with similar prices, capacities, and features, energy efficiency should be the deciding factor. Even though an energy-efficient unit may cost more, it may be the best buy. High efficiency appliances cost less to operate and can pay back the extra initial cost many times over during their lifetimes.

All room air conditioners bear bright yellow EnergyGuide labels which provide information on energy efficiency.

EnergyGuide labels were mandated by Congress as part of the Energy Policy and conservation Act of 1975. Room air conditioners labels display an energy efficiency ratio (EER) in large black numbers. The higher the ratio, the more efficient the appliance. Units with an EER of 10.0 or above are considered very efficient. To help you compare units, a range for competing room air conditioner of the same cooling capacity is printed on the EnergyGuide label below the EER. The label also provides a *costuse chart to calculate the cost of* operating the appliance based on local electricity rates and expected hours of use.

Central air conditioners are rated according to their Seasonal Energy Efficiency Ration (SEER). It is similar to room air conditioners' EER, except that it indicates the average efficiency over the entire cooling season. Like the EER, the higher the SEER, the more efficient the system. To compare the efficiency of two units with equal cooling capacity, take the difference in SEERs and divide by the larger SEER. For example, if system A has a SEER of 6, and system B has an SEER of 8, system B will provide the same amount of cooling as system A while consuming 25 percent less energy.

Finally, compare warranties and maintenance agreements when buying an air conditioner.

An improperly installed unit, even one with a very high efficiency ratio, will waste energy. Whether you install the unit yourself or hire a professional, the following installation tips should be followed.

Remember that each unit has specific installation requirements. Therefore, follow the manufacturer's instructions carefully. In addition, it is important to install the unit in a shaded spot on the house's north or east side because direct sunshine on the unit's outdoor heat exchanger decreases efficiency. If your system already is exposed to the sun, a shading device such as an awning will protect the unit. Also, do not try to hide the unit's external part behind shrubbery. The shrubbery reduces the unit's ability to exhaust air and lower its efficiency. Plenty of air circulation is mandatory. Room air conditioners must be installed on a flat, even surface so that the inside drainage system and other mechanisms operate efficiently.

The room air conditioner should fit snugly inside the sleeve.

*Conservation and Renewable Energy Inquiry and Referral Service.*

## Some Maintenance Tips To Save Money

A dusty air conditioner filter reduces air flow. Examine your unit's filters once a month and clean or replace them when necessary. Keeping your filters clean can cut energy consumption 5 to 15 percent.

Room units should be covered, or removed and stored in winter.

Clogged drain channels prevent a unit from reducing humidity, and the resulting excess moisture may discolor walls or carpet. Channels usually can be cleared by passing a stiff wire through them.

Holes in the seal between the air conditioner and the window frame allow cool air to escape from your home. Moisture can damage this seal so inspect it annually to see that it makes contact with the unit's metal case.

Coils can become clogged with dust. To clean room air conditioner coils, first unplug the unit. Use a vacuum cleaner to remove dust from the interior coils; the exterior coils may be cleaned using water from a garden hose.

*You may wish to install a timer.* When leaving home, you can set the timer so that the unit turns on a half hour before your return. This should be enough time to cool the room. Before purchasing a timer, you must make sure that it can handle the electrical load — otherwise, the timer could be a fire hazard.

For cental air conditioners, a programmable thermostat will control the unit.

For a central air conditioning unit, make sure the ducts are properly insulated, especially those that pass through the attic or any other unconditioned areas.

Make sure furniture does not obstruct air conditioning vents.

Close off unused rooms and close vents in those rooms.

Weatherstrip all doors and windows.

Close all unecessary openings such as fireplace dampers, doors and windows.

Set the thermostat to 78. Setting the thermostat down to 72 would increase your cooling costs *12 to 47* percent, depending on where you live.

Do not set the thermostat lower than the desired temperature when you first turn it on. It will not cool faster; it will only cool to a lower temperature than necessary and waste energy.

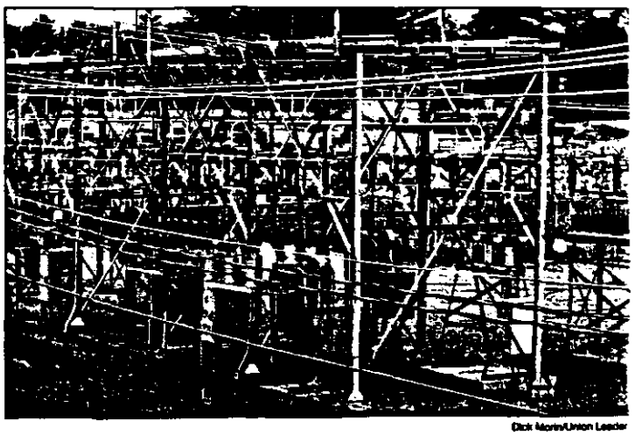
Set the fan speed on high except in very humid weather. When it's humid, set the speed on low; you will get less cooling but more moisture will be removed from the air which will make it feel cooler.

Do not position heat-producing appliances, such as televisions or lamps, near the thermostat. The heat they produce "fools" the thermostat and causes the unit to run longer than necessary.

Keep out the sun with louvers or awnings on the outside of your windows, or draw draperies, blinds or shades indoors. Keep storm windows closed.

Limit heat and humidity producing tasks like cooking and laundering to early morning or late evening.

Use kitchen and bathroom exhaust fans sparingly.

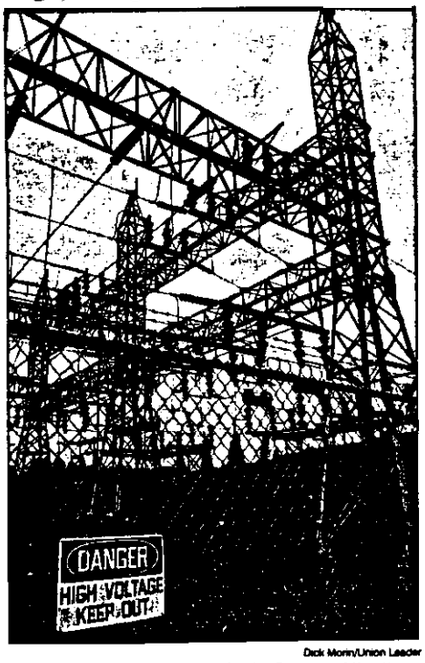


Dick Morin/Union Leader

***Power Source***

**ELECTRICAL COMPONENTS in a PSNH substation on Huse Road in Manchester.**

## High voltage




Dick Morin/Union Leader

**This recent photo shows the Public Service Company of New Hampshire's substation at Amoskeag Falls.**

# Controlling Costs in the Kitchen

**POWER to CHOOSE**

Energy conservation in the kitchen and laundry is as much a matter of good work habits as using the latest energy-efficient household appliances. The following suggestions can help you make better use of your energy dollars.

**Using the Range:** Instead of concentrating on the single meal, cook ahead. It only takes slightly more energy to cook several items in an oven than it does to cook one item.

By doubling recipes, cooking extra and freezing the excess, your own time and energy are saved too. Plan oven meals. Cooking meat, potatoes, and vegetables at the same time is wise use of energy.

Remember that preheating is not necessary with most recipes. Use a timer to time food so you won't be tempted to "peek" as much. Every time the oven door is opened, the temperature drops 25 to 50 degrees. The heating element must then come on to bring the temperature back to where the thermostat is set.

For top-of-the-range cooking, use high heat only to bring liquid to a boil, then switch to the lowest setting possible to keep it simmering. Use as little liquid as possible to conserve both energy and food nutrients and cook until food is just done. When reheating, heat the food but don't recook.

Pans should have flat bottoms, straight sides and tight fitting lids. As much as is possible, match pan size with the heat source so that valuable energy won't heat the surrounding air. When using an electric or smooth-top range, turn off the burner a few seconds before cooking is completed and let the retained heat finish the task.

If you're in the market for a new range, consider purchasing a self-cleaning model. Not only does it eliminate that disliked chore, but the extra insulation required by the self-cleaning system makes a very energy efficient oven. You'll pay more initially, but over the life of the range, the convenience and efficiency will be worth it.

**Microwave Ovens:** These can save a substantial amount of electricity if they are used for most cooking and baking.

Quantities of food to serve four to six people or less make best use of microwave energy. Larger quantities cook more economically by conventional methods.

Little or no energy is saved by using the oven only to warm foods.

**Using the Refrigerator-Freezer:** The refrigerator is one of the largest energy users in the kitchen because it is on call 24 hours every day. The most energy-saving activity with a refrigerator is to minimize the number and length of times the door is opened. Removing a carton of milk now, a couple of eggs in a few minutes and a cube of butter still later can add up to an alarming number of wasted watts. Encourage other family members to limit their viewing time in front of an open refrigerator door.

Cool hot foods slightly before refrigerating. However, it's beter to use a few extra watts than to leave food unrefrigerated too long and risk spoilage. Refrigerators and freezers operate most efficiently when they are full, but not to overflowing.

If yours is a frost-free refrigerator, be sure foods are covered tightly so the refrigerator doesn't work overtime removing the moisture. If you have a manual defrost unit, it should be defrosted before the ice gets more than ¼-inch thick. Ice acts as an insulator and causes the refrigerator to work harder to keep the food cold.

Controls should be set so that the inside temperature is between 38 and 40 degrees; freezer temperatures should be at zero degrees for long-term storage; 10 degrees for short term storage of three months or less. Keeping the temperature colder than is recommended increases energy use.

Generally speaking, a manual defrost refrigerator or freezer is more energy efficient than a frost-free model if the manual defrost model is defrosted before the ice build-up is over one-fourth inch. However, manual defrost refrigerators are virtually non-existent in sizes over 16 cubic feet. Therefore, look for models with foam insulation, energy saver switches that control heater strips around the door to prevent condensation, and other energy-saving features. Side-by-side refrigerator/freezers usually use more energy than models with the freezer on top.

Ice-makers are inefficient and require additional energy to operate. The water line is connected to the hot water with a heater to loosen the ice cubes from the mold and a small motor dumps the cubes.

**Dishwasher:** When it's clean-up time in the kitchen, don't stop using your automatic dishwasher. It takes less water to wash a full load of dirty dishes by machine than an equal amount by hand. Some families find that it takes two or three days to accumulate a full load. Depending on the dishwasher, you may find that it is necessary to pre-rinse a little more thoroughly with cold water, or course.

To further reduce the total amount of energy needed to wash dishes, use the proper amount of dishwasher detergent. Make sure the water is 140 degrees and eliminate the use of a heating element for the drying cycle. This can be done by using the energy switch or cycle or turning off the dishwasher after the final rinse. Leaving the doors slightly ajar will speed the drying process.

If you are purchasing a new dishwater, a useful feature is a booster heater. Since dishwashers need water heated to 140°F, a booster heater raises the temperature of water entering the dishwasher to 140°F., allowing you to set the main water heater to 110-120°F.

*From the University of New Hampshire Cooperative Extension Service*

# Some Conservation and Alternatives For Keeping Cool

Good conservation habits also help hold down electric bills. For instance, only use your air-conditioner when the temperature is above 78.

Close windows and draw drapes and shades during the day to keep out the heat. At night, open the windows and turn on window or attic fans to draw in the cooler air. In addition, passive cooling techniques such as shading, ventilation and vegetation can reduce your cooling needs.

A split-system multiple-evaporator ductless air conditioner is ideal for room additions for homes without ductwork. These air conditioners come in two to five pieces: one piece contains the compressor, condenser and a fan; the others have an evaporator and a fan.

The condenser, installed outside the house, connects to several evaporators, one in each room to be cooled, mounted inside the house. Each evaporator is individually controlled, allowing different rooms or zones to be cooled to varying degrees. Split-system air conditioners are more expensive than central air conditioners, but through zone control homeowners could experience energy savings of 30 to 50 percent.

A heat pipe is a device that transfers heat using no energy by the continuous evaporation and condensation of an internal fluid. A heat pipe heat exchanger linked to a central air conditioner precools the returning warm air before it enters the cooling coil, and then reheats the cool air leaving the coil.

This allows the cooling coil to operate at a lower temperature which enables it to dehumidify more effectively. The heat pipe exchanger is particularly well suited to hot, humid environments since it increases the dehumidification capacity of an air conditioner while causing only a slight loss in efficiency.

Fans can also help cool your home. While fans cannot replace air conditioners, they can provide supplemental cooling, especially on mild summer days. Substituting fans for air conditioners can save 60 percent or more in energy.

Evaporative coolers, or "swamp coolers," also can cool your home. An evaporative cooler works on the principle that it takes heat to evaporate water. An evaporative cooler uses the outside air's heat to evaporate water that is held by pads inside the cooler. The heat is drawn out of the air through this process and the cooled air is blown into your home by the cooler's fan.

An evaporative cooler costs less than an air conditioner and also requires only about a quarter of the electricity to run.

Due to the humidity they add to the air, however, evaporative coolers are only effective in hot, dry regions such as the Southwest.

An evaporative cooler also requires a large amount of water, about 35,000 gallons annually, which may be a problem for areas where water has to be conserved. Also, the evaporative cooler requires more maintenance than an air conditioner.

A heat pump can be an alternative to conventional air conditioners. In its cooling mode, an air-to-air heat pump works like an ordinary air conditioner. But unlike an air conditioner, the heat pump can reverse during cold weather, absorbing heat from the outdoor air and transferring it indoors.

Though air-to-air is the most common type of heat pump, water-to-air and ground-to-air heat pumps are also available. Water-to-air heat pumps exchange heat with either ground surface water or well water.

Ground-to-air heat pumps exchange heat with the ground. Heat pumps are most cost effective when included in new home's design rather than as an addition to existing home.

*From the Conservation and Renewable Energy Inquiry and Referral Service.*

## On Sunshine and Megawatts

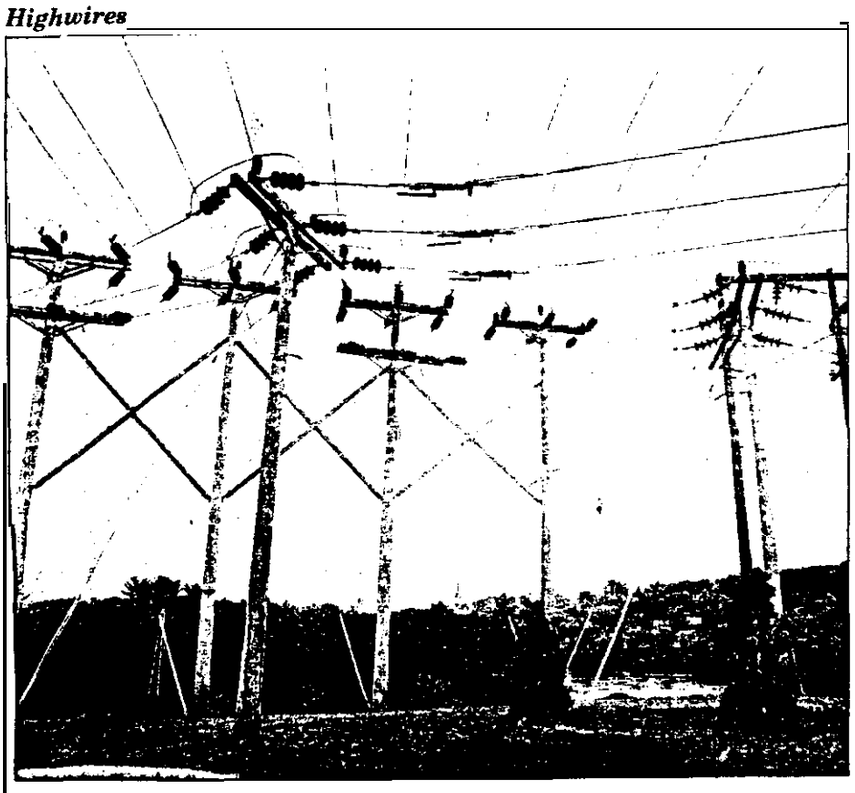
Photovoltaics. Even though you may not know what it's called, you already are familiar with the basic elements of the photovoltaic effect.

Every day, you interact with the two basic factors of photovoltaics: sunlight and electricity. Now you can learn how the two work together. Literally the term means "light volt," and it's called PV for short. PV is light converted to electricity, or if you prefer, electricity from sunlight.

Most people are familiar with solar watches and calculators, but few realize that PV powers satellites, communications systems, lights, water pumps and hundreds of electrical appliances.

Here's how photovoltaics works: Streams of light called photons leave the surface of the sun and come toward the Earth. When a photon reaches earth and hits a PV cell, it frees electrons present in the cell. The photons provide the initial push the electrons need to start moving. As the electrons move from the PV cell to an attached wire, they carry with them an electrical charge. As more photons hit the surface of the PV cell, more electrons are freed and more electrical charges are sent.

*Highwires*



Jack Monn/Union Leader

POWER LINES cross the sky at the Public Service Co. of New Hampshire plant at Amoskeag Falls.

# Water-Heating Tips For Staying Out of Hot Water

The next time you pay your utility bill, try one simple calculation.

Divide the total amount by seven. The result is the amount you spend to heat your water. (If you receive separate utility bills for gas and electricity, use the gas bill for this calculation if you have a gas water heater; use the electric bill if you have an electric water heater.)

Of course, you may think this cost is a small price to pay for the convenience of a hot shower. But during the course of a year, this cost adds up. And when you consider that 95 million households in this country pay the same percentage, it is easy to see how much money — and energy — is used to heat water.

Several measures can help you decrease water-heating costs in your home. Some specific actions include reducing the amount of hot water used, making your water-heating system more energy efficient, and using off-peak power to heat water.

Generally, four destination points in the home are recognized as end users for hot water: faucets, showers, dishwashers and washing machines.

Now, you do not have to take cold showers, dine on dirty dishes, or wear dirty clothes to reduce your hot-water consumption. Less radical measures are available that will be virtually unnoticeable once you apply them.

Simply repairing leaks in faucets and showers can save hot water. A leak of one drip per second can cost $1 per month, yet could be repaired in a few minutes for less than that. And some apparently insignificant steps, when practiced routinely, could have significant results. For example, turning the hot-water faucet off while shaving or brushing your teeth can also reduce water-heating costs. Another option is limiting the amount of time you spend in the shower.

Other actions may require a small investment of time and money. Installing low-flow showerheads and faucet aerators can save significant amounts of hot water. Low-flow showerheads can reduce hot-water consumption for bathing by 30 percent, yet still provide a strong, invigorating spray. Faucet aerators, when applied in commercial and multifamily buildings where water is constantly circulated, can also reduce water-heating energy consumption.

Older showerheads deliver four to five gallons of water per minute. However, the Energy Policy Act of 1992 sets maximum water flow rates at 2.5 gallons per minute at a standard residential water pressure of 80 pounds per square inch.

A quick test can help you determine if your shower is a good candidate for replacement. Turn on the shower to the normal pressure you use, hold a bucket that has been marked in gallon increments under the spray, and time how many seconds it takes to fill the bucket to the gallon mark.

If it takes less than 20 seconds, you could benefit from a low-flow showerhead. A top-quality, low-flow showerhead will cost $10 to $20 and pay for itself within four months. Lower quality showerheads may simply restrict water flow, which often results in poor performance.

Because of the different uses of bathroom and kitchen faucets, you may need to have different water flow rates in each location. For bathroom faucets, aerators that deliver one-half to one gallon of water per minute may be sufficient. Kitchen faucets may require a higher flow rate of two to four gallons per minute if you regularly fill the sink for washing dishes. On the other hand, if you tend to let the water run when washing dishes, the lower flow rate of one-half to 1 gallon per minute may be more appropriate. Some aerators come with shut-off valves that allow you to stop the flow of water without affecting the temperature.

A common assumption is that washing dishes by hand saves hot water. However, washing dishes by hand several times a day could be more expensive than operating some automatic dishwashers. If properly used, an efficient dishwasher can consume less energy than washing dishes by hand, particularly when you only operate the dishwasher with full loads.

The biggest cost of operating a dishwasher comes from the energy required to heat the water before it ever makes it to the machine. Heating water for an automatic dishwasher can represent about 80 percent of the energy required to run this appliance.

Average dishwashers use eight to 14 gallons of water for a complete wash cycle and require a water temperature of 140 degrees for optimum cleaning. But setting your water heater so high could result in excessive standby heat loss. This type of heat loss occurs because water is constantly heated in the storage tank, even when no hot water is used.

A "booster" heater can increase the temperature of the water entering the dishwasher to 140 degrees, recommended for cleaning. Some dishwashers have built-in boosters that will automatically raise the water temperature, while others require manual selection before the wash cycle begins. A booster heater can add about $30 to the cost of a new dishwasher but should pay for itself in water-heating energy savings in about 1 year if you also lower your water heater temperature. Reducing the water heater temperature is not advisable, however, if your dishwasher does not have a booster heater.

The most efficient dishwasher on the market can cost half as much to operate as the most inefficient model. If you are planning to purchase a new dishwasher, check the EnergyGuide labels and compare the approximate yearly energy costs among brands. Dishwashers fall into one of two categories - compact capacity or standard capacity. Although compact-capacity dishwashers may appear to be more energy efficient, they hold fewer dishes and may force you to use the appliance more frequently.

*From the Energy Efficiency and Renewable Energy Clearinghouse*